

**SECRET**

29 May 1962

MEMORANDUM FOR: Chief, Technical Plans & Development Staff  
 THROUGH: Acting Chief, Technical Development Branch  
 SUBJECT: Staff Study, "Image Quality Meter, Test and Evaluation  
 REFERENCE: Letter from Director, CIA, dated 14 October 1961, to  
 the Director, National Bureau of Standards

1. PROBLEM:

A letter from the Director, CIA, dated 14 October 1961, to the Director, National Bureau of Standards, requested their participation in a test and evaluation program of the Image Quality Meter, designed and fabricated by the [REDACTED] under contract #

25X1A

[REDACTED] for EPIC. The successful completion of the program would hopefully establish certain operational procedures and standards by which the community of the government and military users of this equipment could communicate and coordinate results of film evaluation in terms of resolution, acutance, and granularity by an academic, instrumental approach, rather than vague qualitative terms.

## DECLASS REVIEW by NIMA/DOD

2. FACTS

For a number of years, during the transition period during which photography has emerged from an art to a science, the users of photographic materials for reconnaissance and mapping have defined the basic terms of the photographic image quality in a variety of qualitative terms. For example, the term resolution, expressed in lines/mm, means different things to different users. Unless the contrast ratio and aspect ratio of the target is specified in precise terms, the resolution of a lens, a film emulsion, or a camera system has very little academic meaning. The same quality might well be expressed in terms of sine wave response, point spread function, or spatial frequency. Further, all of these terms must be qualified by stating that they apply to the optics, the photographic film, or the complete system in either a static or operational condition. The acutance must also be expressed in the same terms as it applies to a sharply defined boundary between two adjacent areas of high and low luminance, as a step function of density difference with respect to distance. The term granularity has been generally accepted as the Selwyn coefficient, defined as:

$$G = \frac{rms}{2\pi}$$

**SECRET**

where  $\text{rms}$  = the rms fluctuation of density about a mean value in an area of constant exposure; and

$a$  = the scanning area in microns<sup>2</sup>.

The National Bureau of Standards was selected as the appropriate body to evaluate the validity of the designed instrumental approach, as well as operational procedures to be followed by the several users of this equipment. If only one image quality meter had been designed, fabricated, and delivered to EPIC, there would be no problem since the meter readings of resolution, acutance, and granularity would have only special significance to those persons within EPIC who use the instrument for their specific program. The contract under which this equipment was manufactured was unclassified and a number of government and military services became aware of its existence. The [redacted] now has orders for five production units and seven more are being fabricated. In order that the several users of this equipment can communicate and coordinate their findings, the test and evaluation program, as conducted by NBS, must be acceptable to all concerned.

### 3. DISCUSSION

EPIC has received a letter, dated 4 May 1962, from NBS which makes reference to the previous discussions and includes a program proposal for approval. The proposed project number is 0003-30-02430. Space and personnel at NBS have been allocated for this task. The Image Quality Meter has been delivered to EPIC and presently is in storage at the warehouse. Tentative arrangements have been made with [redacted] of [redacted] to be on hand at NBS for the first few days of the test program. During this time, [redacted] could assist in the installation and initial operational techniques.

According to the correspondence from NBS, dated 4 May 1962, work may not be performed on this project prior to the receipt of an order from this Agency authorizing the work and specifying the appropriation to be charged. This authorization can be made only after it is approved by the Technical Development Committee.

### 4. CONCLUSIONS

- a. The test and evaluation program, as submitted by NBS, is acceptable.
- b. Space and personnel of NBS have been allocated.
- c. A project number has been assigned.
- d. Total cost of the program is [redacted] of which could be used during the remainder of this fiscal year.
- e. The final report would be submitted 1 July 1963, or earlier.

a. The project will be unclassified.

b. RECOMMENDATIONS

a. It is recommended that the Technical Development Committee approve this program of test and evaluation by NBS on the Image Quality Meter.

b. Arrangements to transfer the instrument to NBS should be made as soon as official notification of the appropriation is received.

c. [redacted] should be contacted relative to his participation in the initial phases of this program.

25X1A

[redacted] 25X1A

KPIC/TPSSD/KDB:EMK:df(3591)